Acoustic Localisation of Coronary Artery Stenosis: Wave Propagation in Soft Tissue Mimicking Gel

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Plaque in coronary arteries produces turbulent flow downstream and time-varying wall shear stresses. These produce low amplitude acoustic shear waves which propagate through the chest and can be measured by skin sensors. This acoustic surface signature may provide a cheap non-invasive means of diagnosing arterial disease. We report here measurements of 1-D free compressive and shear oscillations induced in tissue mimicking agarose gel specimens, following the sudden release of a load; and 2-D forced oscillations, induced in the centre of the gel by an electro mechanical vibrator or by turbulent flow. Concurrently, we are writing direct and inverse solver software (described in a companion presentation) to simulate the response of the gel to the shear waves. This mathematical loop makes it possible to characterise the source given the signal and to compare material data with predicted values. Supported by the Engineering and Physical Sciences Research Council, grants: EP/H011072/1 & EP/H011285/1.

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